TITLE OF THE INVENTION

LINEAR COMPRESSOR

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of Korean Patent Application No. 2003-29481, filed May 9, 2003 and Korean Patent Application No. 2003-95537 filed on December 23, 2003 in the Korean Intellectual Property Office, the disclosure of which are incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates, in general, to linear compressors and, more particularly, to a linear compressor having a linear motor which includes a moving part and a stationary part to reciprocate a piston.

2. Description of the Related Art

Generally, a compressor has been used in a refrigeration system operated with a refrigerant which sequentially and repeatedly flows through a refrigeration cycle including compression-condensation-expansion-evaporation. In the refrigeration system, the compressor compresses the refrigerant and then discharges the compressed refrigerant to an outside of

EXPRESS MAIL LABEL
NO.: EV 327552495 US

the compressor. A linear compressor rectilinearly reciprocates a piston using a linear motor to compress a refrigerant.

A conventional linear compressor includes a hermetic casing. A compressing unit to compress the refrigerant and a drive unit to provide a drive power to the compressing unit are housed in the hermetic casing.

The compressing unit includes a cylinder block which defines a compression chamber therein, and a piston which reciprocates in the compression chamber to compress the refrigerant. A cylinder head is mounted to an end of the cylinder block, with a suction chamber and an exhaust chamber being provided on predetermined portions of the cylinder head.

The drive unit includes a stationary part, an inner core, and a moving part. The stationary part generates an electromagnetic field when electric power is supplied to the stationary part. The inner core is spaced apart from the stationary part by a predetermined distance, and generates a magnetic flux in cooperation with the stationary part. The moving part is provided between the stationary part and the inner core to drive the piston.

The detailed construction of the stationary part included in the conventional linear compressor is as follows. The stationary part includes a cylindrical bobbin, and a coil wound around the bobbin. A plurality of outer cores are fitted over the bobbin in an axial direction of the bobbin to be spaced

apart from each other in a circumferential direction of the bobbin.

Further, a plurality of core seating depressions are respectively provided on upper and lower surfaces of the bobbin so that each of the core seating depressions extends to a position on an inner surface of the bobbin, so that the outer cores are seated on the core seating depressions.

In the conventional linear compressor, when the electric power is applied to the coil, the electromagnetic field is generated along the outer cores. By the electromagnetic field, the moving part is rectilinearly reciprocated. Simultaneously, the piston connected to the moving part reciprocates in the compression chamber, thus compressing the refrigerant.

However, the conventional linear compressor is problematic as follows. The outer cores are seated on the bobbin without any holding unit. Thus, in case where the bobbin may be deformed by heat generated during an operation of the linear compressor or vibrations generated during the operation of the linear compressor may continuously act on the bobbin, the outer cores seated on the bobbin may be dislodged from original positions thereof.

Thereby, gaps between the moving part and the outer cores are not constant, thus deteriorating efficiency of the linear motor.

The conventional linear compressor has another problem in

that the linear compressor may be damaged or broken, when the moving part may directly impact the outer cores.

SUMMARY OF THE INVENTION

Accordingly, it is an aspect of the present invention to provide a linear compressor which improves a structure to hold a core on a bobbin, thus allowing the core to be firmly and reliably held on the bobbin.

Additional aspects and/or advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

The above and/or other aspects are achieved by a linear compressor, including a cylinder block, a piston to reciprocate in the cylinder block, thus compressing a refrigerant, a moving part to reciprocate along with the piston, and a stationary part to drive the moving part in cooperation with the moving part. The stationary part includes a bobbin wound with a coil, a core to surround the bobbin, and a molded part provided through an injection molding process to fill a space between the core and the bobbin, thus supporting both the core and the bobbin.

According to an aspect of the invention, the core may include a plurality of cores, and the molded part may fill a

space between the plurality of cores.

In another aspect of this embodiment, each of the plurality of cores may include a pair of teeth parts to face the moving part, and the molded part may fill a space between the pair of teeth parts.

In yet another aspect of this embodiment, the molded part may be made of a resin material.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the preferred embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a sectional view of a linear compressor, according to an embodiment of the present invention;

FIG. 2 is a perspective view of a bobbin wound with a coil included in the linear compressor of FIG. 1;

FIG. 3 is a perspective view of outer cores of the linear compressor of FIG. 1; and

FIG. 4 is a perspective view of the outer cores assembled with the bobbin included in the linear compressor of FIG. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Reference will now be made in detail to the present preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout. The embodiment is described below in order to explain the present invention by referring to the figures.

FIG. 1 is a sectional view of a linear compressor, according to an embodiment of the present invention.

Referring to FIG. 1, the linear compressor includes a hermetic casing 10. A compressing unit 20 to compress a refrigerant and a drive unit 30 to drive the compressing unit 20 are housed in the hermetic casing 10.

The compressing unit 20 includes a cylinder block 21 which defines a compression chamber 21a therein, and a piston 22 which is received in the compression chamber 21a to reciprocate in the compression chamber 21a. A cylinder head 23 is mounted to a bottom of the cylinder block 21, and includes both a suction chamber (not shown) and an exhaust chamber (not shown).

The drive unit 30 comprises a linear motor including an inner core 31, a stationary part 40, and a moving part 50. The inner core 31 is provided outside the cylinder block 21. The stationary part 40 surrounds the inner core 31 while being spaced apart from an outer circumferential surface of the inner core 31 by a predetermined interval, and generates an electromagnetic field. The moving part 50 includes a magnet 51

to reciprocate vertically by a magnetic flux generated between the inner core 31 and the stationary part 40.

The stationary part 40 includes a bobbin 41 wound with a coil 42, and outer cores 43 to surround the bobbin 41. The assembly of the bobbin 41 and the outer cores 43 will be described in detail in the following with reference to FIGS. 2 through 4.

Referring to FIG. 2, the bobbin 41 has a cylindrical shape. A plurality of core seating depressions 41a are provided on upper and lower surfaces of the bobbin 41 to be spaced apart from each other in a circumference direction of the bobbin 41. First, the coil 42 is wound around the bobbin 41.

The outer cores 43 shown in FIG. 3 are seated on the core seating depressions 41a of the bobbin 41. Each of the outer cores 43 includes a pair of teeth parts 43a and 43b to face the moving part 50. The teeth parts 43a and 43b increase areas facing the moving part 50 which interacts with the outer cores 43, thus efficiently increasing strokes of the piston 22.

As shown in FIG. 4, a molded part 44 is provided through an injection molding process to fill spaces between the bobbin 41 and the outer cores 43, thus supporting the bobbin 41 and the outer cores 43.

The molded part 44 comprises a resin material, and fills spaces between the outer cores 43 and a space between the pair

of teeth parts 43a and 43b of each of the outer cores 43, so that the outer cores 43 are firmly held on the bobbin 41.

The operation and operational effects of the linear compressor according to the present invention will be described in the following.

When electric power is applied to the coil 42 wound around the bobbin 41, an electromagnetic filed generated along the coil 42 interacts with an electromagnetic field generated by the magnet 51, thus reciprocating the piston 22 vertically. By a reciprocating motion of the piston 22, the refrigerant is drawn, compressed, and then discharged.

In this case, the outer cores 43 are firmly held on the bobbin 41 by the molded part 44, thus preventing the outer cores 43 from being dislodged from the bobbin 41 even when vibrations may occur during an operation of the linear compressor.

Further, the molded part 44 surrounds the bobbin 41, thus preventing the bobbin 41 from being thermally deformed by heat generated during the operation of the linear compressor.

As is apparent from the above description, the present invention provides a linear compressor, which is constructed so that outer cores are firmly held on a bobbin through a molded part provided through an injection molding process.

Therefore, gaps between a moving part and the outer cores are kept constant when the linear compressor operates, and

further the gaps between the moving part and the outer cores are kept to a minimum, thus enhancing efficiency of a linear motor.

Although an embodiment of the present invention has been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.